Behaviour of Market Arrivals and Prices of Ragi in Karnataka

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ABSTRACT: The present study was conducted to examine the arrivals and prices behaviour of ragi in Karnataka which was based on the secondary data from Jan 2007 to Dec 2020. Nagamangala, Bengaluru and Arsikere markets for ragi were selected for the study and computed trend in arrivals and prices with seasonal variations and constraint faced by the ragi growers. The result revealed that annual growth is increase in price of ragi every year was observed to be high in case of Bengaluru market with ₹ 202.52 per followed by Nagamangala market with ₹ 144.27 per quintal and Arsikere market with ₹ 131.36 per quintal. The reason for the behavior in arrivals in the selected markets is on account of huge transaction in the selected markets. It is because of the selected market doesn't depend on the districts in which highest area under ragi is observed. The prices of ragi showed increasing trending in all the selected markets which may be due to increase in consumption due to its nutritional value, which in turn increases the demand for ragi coupled with the inflationary trend in the prices of ragi. Thus, a positive trend in all the markets under study was observed. Fluctuation in market price followed by high margin of middlemen and inadequate storage was identified as the major constraints in the study area. Due to high fluctuation in the arrivals and prices of ragi in selected markets during certain period, the government should intervene to equalize the ragi prices at least in the districts which in turn reduce the price variation to larger extent. The traders must be encouraged to quote prices strictly according to scientific grading as and when such a grading system made available to them.

Keywords: Trend, Seasonal Indices, Arrivals and Price behaviour, Co-efficient of variation.

INTRODUCTION

Food-grains constitute the main food items of the entire population in the country (Shobana *et al*., 2013). As a result of sustained efforts food grain production has increased from 50.8 million tonnes in 1950-51 to 296.65 million tonnes in 2019-20. In the world, the total area under millets in 2019 was 31.65 million hectares which provided about 28.37 million tonnes of millets with a productivity of 896.3 kg/ha (Anonymous, 2021). In tropical regions of the world, millets are considered as important crops due to their resistance to pests and diseases, short growing season and productivity under hardy and drought conditions. Ragi (*Eleusine coracana*) also known as finger millet is one of the important food crop mainly used in India and Africa.

It is rich in protein, calcium, phosphorus, iron, fiber and vitamin content. The calcium content is higher than all cereals and iodine content is considered to be highest among all the food grains. Ragi has best quality protein along with the presence of essential amino acids, vitamin A, vitamin B and phosphorus. In India, finger millet is grown and consumed in Karnataka, Andhra Pradesh, Tamil Nadu, Odisha, Maharashtra, Kumaon region of Uttarakhand and Goa. The total area under finger millet in India is 891 thousand hectares (2018-19). Karnataka stands first with an area of 527 thousand

hectares (2018-19) which provided 1,239 thousand metric tonnes of ragi was produced in 2018-19. Highest productivity of ragi was recorded as 1,390 kg/ha with highest in Tamil Nadu (3,257 kg/ha) (Anonymous, 2021).

Understanding the trends and seasonality in arrivals and prices helps the farmers and stakeholders in supply chain in making decisions to overcome and to sort out price shocks through appropriate choices. This enables farmer's decision pertaining to when to sell and where to sell. The knowledge on the inter relations between the arrivals and prices is more important for assessing the extent of price fluctuations over time. Therefore, present study is undertaken to help ragi stakeholders in taking right decision of right place and right time to sale to their produce. The specific objective is to analyze the behavior of market arrivals and prices of ragi in different markets of Karnataka

RESEARCH METHODOLOGY

This study is purely based on secondary data regarding to monthly market arrivals and average prices of ragi in major APMC markets of Karnataka. Major markets were chosen on the basis of quantity of arrivals. Nagamangala, Bengaluru and Arsikere markets for the ragi were selected. The daily market arrivals and prices

information of ragi were compiled from Krishimaratavahini website for the period from January 2007 to December 2020.

Trend analysis: Analysis of trend was used for arrivals, prices and quantity of ragi for the period from 2007 to 2020. Linear trend function was employed for the analysis and the model is of the following form.

$Y = a + b_t + e_t$

Where,

Y = dependent variable for which trend is estimated

      a = intercept

      b = regression co-efficient

      t = time variable

      e = error term

The significance of 'b' was tested by 't' ratio: $t = \frac{b}{SE\,(b)}$

Where,

SE (b) = (SS_Y(Y) ^{2}SS_t)/ ((n-2) SS_t)

SS_Y = (Y) ^{2}- (Y) ^{2} / n

The critical value is t-table value for n-2 degrees of freedom.

Seasonal indices were calculated by adopting the following steps:

According to multiplicative model, price series can be decomposed into four component i.e. (Price = Trend × Cyclical × Seasonal × Random/Irregular components). Trend is the tendency of a series to upward or downward direction over the period of time. Cyclical phenomenon repeats itself over the period. Seasonal variations are periodic moments which repeats during the period of 12 months regularly every year, have their origin in the nature of year itself. The analysis in this study focused on the seasonal component by removing other components (viz; trend, cyclical and random) from price series.

To estimate the seasonal price index of a time series, central moving average (CMA) is estimated using the following formula

$$CMA_t = \sum \frac{p_i}{n}$$

i= t-1/2(n-1)

Where:

CMA = Central Moving Average,

P_i = Nominal price,

n= number of periods

Central moving average for a given number of periods substitute and observed value in the time series by the average of that value. Consequently, the central moving average eliminates random variations and emphasizes systematic movements of variables series. Central moving average has the same trend as the price, show cyclical fluctuations appearing in the original series. The central moving average represents the trend and cyclical components of the original series and eliminates seasonality and randomness.

Seasonality is expressed as 12 indexes that represent the ratio of the price each month to the average annual price. Seasonal index (SI) can then be written as:

$SI = TCSE_i/TC_i = SE_i = (P_i/CMA_i) \times 100$

Seasonality Index includes seasonal fluctuation in addition to randomness (E). The SI is already deflated as it is calculated by dividing nominal price series (the original price) by another nominal series. To remove the effect of irregular movement from the SI values, the averaging of SI for each month over the different years is used, then adjusting SI figure series by the adjustment factor,

$$\text{Adjustment factor} = 1200/\sum_{i=12}^{12} SI$$

Grand seasonal index (GSI) was calculated by obtaining the average seasonal index for each month of a given year and then adjusting this series in such a way that it adds up to 1200 specifically:

$$\text{Grand Seasonal Index} = SI * 1200/\sum_{i=12}^{12} SI$$

Where, SI= is the average seasonal index for month i

GSI is an average of the seasonal indices that removes all irregular movements of the time series. It represents the pure seasonal average of the series during the period under analysis.

Problem Confrontation Index: The problem confrontation index was used to find out the major problems by pigeon pea and ragi growers while cultivation and marketing of produce, market intermediaries and processing units through ranking method. The ranking was calculated through the following formula.

$PCI = (P_n \times 0) + (P_l \times 1) + (P_m \times 2) + (P_h \times 3)$

Where,

PCI = Problem Confrontation Index

P_n = Frequency of the farmers who rated the problem as not encountered

P_l = Frequency of the farmers who rated problem as low

P_m = Frequency of the farmers who rate the problem as moderate

P_h = Frequency of the farmers who rated the problem as high

Based on formula, the problems were listed in rank-order. First rank indicates the most severe problem.

RESULTS AND DISCUSSION

A. Trend in arrivals and prices of ragi

The results related to trend in arrivals and prices of ragi in Karnataka is summarized in Table 1. It shows that the highest annual arrivals were observed in case of Nagamangala market with 826.50 quintals with the contribution of time variable having the value of 54 per cent. In case of Bengaluru market, the arrivals of ragi showed negative trend with decrease in the arrivals of 359.60 quintals with the time variable explaining to the tune of 97 per cent. With respect to Arsikere market, as it can be observed from the table that there was a negative trend with decrease in arrivals of 382.70 quintals which was explained by the time variable with the value of 90 per cent. It can be depicted from the Table 1 that the trends in average prices of ragi at major markets in Karnataka. Annual increase in price of ragi every year was observed to be high in case of Bengaluru market with ₹ 202.52 per quintal with the time variable explained to the tune of 93 per cent. But in case of Nagamangala market, the price increased at the rate of ₹ 144.27 per quintal every year with the time variable explained by 91 per cent. With respect to Arsikere market, the price of ragi increased yearly to

the extent of ₹ 131.36 per quintal with the time variable explained by 89 per cent.

It could be seen from the Table 1, that the prices of ragi showed increasing trending in all the selected markets which may be due to increase in population and increase in awareness about the benefits of ragi towards the health condition which in turn increases the demand for ragi coupled with the inflationary trend in the prices of ragi. Thus a positive trend in all the markets under study was observed. It shows that farmers developed a positive attitude towards the benefits of regulated markets and diverting their produce towards the regulated markets where higher prices is observed. The similar findings were revealed in the study of Shruti and Krishnamurthy (2013); Sahoo and Singh (2017).

Table 1: Trend in arrivals and prices of ragi in different markets of Karnataka.

| Sr.No. | Year | Nagamangala | | Bengaluru | | Arsikere | |
		Arrivals (Quintals)	Prices (₹/qtl)	Arrivals (Quintals)	Prices (₹/qtl)	Arrivals (Quintals)	Prices (₹/qtl)
1.	2007	59827	715	105976	895	73972	639
2.	2008	75060	740	102709	868	77388	678
3.	2009	57678	930	107654	1076	112603	820
4.	2010	66163	938	106060	1180	99114	825
5.	2011	115409	928	105336	1130	106066	834
6.	2012	89038	1263	90773	1438	97796	1198
7.	2013	79346	1750	84308	2213	56746	1719
8.	2014	97120	1577	80617	2052	64097	1454
9.	2015	100443	1533	73852	2049	54572	1390
10.	2016	264643	1767	55641	2210	39756	1716
11.	2017	91182	2622	60762	3390	34996	2431
12.	2018	170172	2131	64731	2935	55277	1961
13.	2019	280234	2308	72696	3070	58707	2136
	2020	80600	2328	57748	3099	38170	1985
	Intercept	3485.25	455.85	9654.54	452.74	8639.66	427.98
	Slope	826.50	144.27	-359.60	202.52	-382.70	131.36
	R²	0.54	0.91	0.97	0.93	0.90	0.89
	F	5.98*	94.96**	64.57**	110.57**	14.59**	70.64**

Note: ** Significant at 1 percent;   * Significant at 5 per cent

B. Seasonal indices of monthly arrivals and prices of ragi in major markets of Karnataka

The result in the Table 2 shows the seasonal indices of ragi arrivals and prices within a year over different months in the major markets of Karnataka. It is revealed that for the Nagamangala market, the highest arrivals indices were observed in the month from November to January. Among these months, November (216.01 %) recorded highest arrivals and the least arrivals was found in the month of July (74.18 %). With respect to Bengaluru market, the highest arrivals indices were observed in the month from March to August. The highest arrivals were found in the month of June (113.34 %) and lowest arrivals in the month of September (90.28 %). In case of Arsikere market, there were ups and downs in the arrivals index, the highest arrivals were found in the month of April (164.32 %) and the lowest arrivals in the month of March (70.73 %). The probable reason for this behavior in arrivals in the selected markets is on account of huge transaction in the selected markets as the selected market doesn't depend on the districts in which highest area under ragi is observed. The market selection was completely based on highest arrivals with the main motive to bring about the transaction of products to the different markets irrespective to its area under production. Similar findings were noted in the study Sonvanee and Koshta (2019).

Table 2: Seasonal indices of monthly arrivals and prices of ragi in major markets of Karnataka (Jan 2007 to Dec 2020) (Percent).

| Sr. No. | Month | Nagamangala | | Bengaluru | | Arsikere | |
		Arrivals (Quintals)	Prices (₹/qtl)	Arrivals (Quintals)	Prices (₹/qtl)	Arrivals (Quintals)	Prices (₹/qtl)
1.	January	120.85	97.34	92.38	96.18	98.08	99.53
2.	February	85.81	98.52	91.64	96.12	92.45	96.85
3.	March	101.51	99.79	109.20	95.98	70.73	101.60
4.	April	81.77	100.65	100.84	97.94	164.32	101.64
5.	May	82.89	99.52	100.87	99.52	87.95	97.98
6.	June	83.12	97.50	113.34	97.60	122.34	95.55
7.	July	74.18	97.61	108.77	100.90	88.57	99.38
8.	August	75.28	100.40	103.86	101.25	103.62	102.37
9.	September	82.30	102.16	90.28	101.57	102.73	98.86
10.	October	85.32	101.66	93.11	102.20	100.43	97.59
11.	November	216.01	102.88	97.51	105.60	85.70	101.42
12.	December	110.95	101.97	98.20	105.12	83.07	107.24
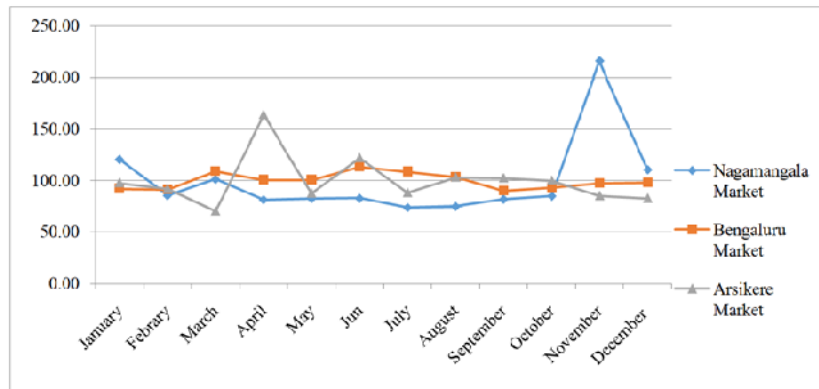
Fig. 1. Seasonal indices of ragi arrivals in different markets.

It is revealed that the prices indices in Nagamangala market were maximum in the month of November (102.88 %) and the least in the month of January (97.34 %). In cases of Bengaluru market, the highest prices were observed in the month of November (105.60) and lowest prices in the month of March (95.98 %). With respect to Arsikere market, the highest prices were noted in the month August (102.37 %) and least was observed in the month of June (95.55 %). The probable reason for this behavior in prices in the selected markets is on account of more area under ragi near the selected markets and huge quantities of products were transacted through the selected market.

The selected markets have huge local buyers than outsiders. The lack of competition during lean months may cause sharp fall in prices in the selected markets. From the foregoing discussion it is clear that there is seasonality in the behavior of ragi in all the selected markets. Similar findings were noted in the study Makhare and Tarpara (2019).

C. Variability in the market arrivals and prices of ragi
The pattern of market arrivals and price behaviour of ragi over the period 2007-2020 was examined using the mean value and the coefficient of variation for each of the twelve months. The crop-wise analysis across different markets showed that in the Nagamangala market (Table 3), the variability in market arrivals of ragi was maximum (205.59 %) during the month of December and quite low (37.69 %) during September. The average volume of ragi received in Nagamangala market was lowest 7,183.71 tonnes in the month of July and maximum (20,918.93 tonnes) during the peak season month of November. In comparison, in the Bengaluru market, the variability in the arrivals of ragi in terms of coefficient of variation was more pronounced; it ranged from 24.03 per cent in May to 44.13 per cent in June. The average market arrivals ranged from 6,281.29 tonnes in September to 7,885.79 tonnes in June. The extent of variability in the arrivals of ragi in the Arsikere was ranging between 40.00 per cent in May to 131.77 per cent in April. Similar findings were noted in the study (Kumar *et al.*, 2017).

The extent of monthly price variability in different markets for ragi has been brought out in Table 4. The price variability, measured in terms of coefficient of variation, in the Nagamangala market was more pronounced in June (45.11 %) and was lower during the month of December (38.61 %) The pattern was not uniform in the Bengaluru market, where price variability was noted high for April (50.09 %) and in case of Arsikere market it is in the observed in the month of March (48.34 %). Nevertheless, the price for ragi was relatively more stable in the selected market. An almost similar pattern of price behaviour was observed in Bengaluru and Arsikere markets. Similar findings were noted in the study Darekar *et al.,* (2015).

Table 3: Variability in the market arrivals of ragi in major markets of Karnataka (Jan. 2007 to Dec. 2020) (Quintals).

Months	Nagamangala Market		Bengaluru Market		Arsikere Market	
	Mean	CV (Percent)	Mean	CV (Percent)	Mean	CV (Percent)
January	11703.36	151.05	6427.57	24.68	5658.57	50.04
February	8310.29	77.65	6376.21	28.49	5333.64	66.15
March	9830.29	46.42	7597.43	30.33	4080.71	73.34
April	7918.79	61.84	7016.14	34.26	9480.36	131.77
May	8026.64	62.54	7017.71	24.03	5074.36	40.00
June	8049.00	56.12	7885.79	44.13	7058.57	75.89
July	7183.71	65.07	7567.57	31.51	5109.71	34.21
August	7290.50	57.10	7226.00	27.31	5978.14	38.22
September	7969.71	37.69	6281.29	30.14	5927.00	30.69
October	8262.64	63.29	6478.21	33.37	5794.36	43.38
November	20918.93	205.59	6784.29	34.53	4944.64	46.97
December	10744.36	61.10	6832.00	29.29	4792.79	46.66

Table 4: Variability in the prices of ragi in the major markets of Karnataka (Jan 2007 to Dec 2020) (₹/qtl).

Months	Nagamangala Market		Bengaluru Market		Arsikere Market	
	Mean	CV (Percent)	Mean	CV (Percent)	Mean	CV (Percent)
January	1497.00	43.79	1896.29	46.98	1406.50	47.88
February	1515.14	44.15	1895.21	48.34	1368.71	46.04
March	1534.57	43.48	1892.36	49.11	1435.79	48.34
April	1547.86	43.25	1931.07	50.09	1436.36	45.93
May	1530.43	44.82	1962.21	47.86	1384.64	43.93
June	1499.36	45.11	1924.36	46.83	1350.29	41.94
July	1501.14	43.19	1989.36	46.11	1404.50	44.92
August	1544.07	44.55	1996.29	44.42	1446.64	45.10
September	1571.07	43.38	2002.64	44.62	1397.07	40.51
October	1563.36	39.79	2014.93	43.80	1379.14	38.49
November	1582.07	40.32	2082.07	42.50	1433.21	42.84
December	1568.21	38.61	2072.64	42.65	1515.50	41.07

D. Marketing constraints faced by the ragi growers
Marketing constraints was summarized with the help of Problem confrontation Index score represented in Table 5. The sample size for the research was 90 ragi growers. The result shows that the marketing constraints faced by the ragi growers in which fluctuation in market price was ranked first with Problem Confrontation Index score 144 in the study area followed by high margin of middlemen with Problem Confrontation Index score 138, delay in cash payment from the traders with Problem Confrontation Index score 131, inadequate storage facilities with Problem Confrontation Index score 130, high cost of transportation with Problem Confrontation Index score 128, less awareness of online trading with Problem Confrontation Index score 126 and malpractice in market yard with Problem Confrontation Index score 112. The similar findings were observed in the study Gireesh *et al.,* (2019); Kumari *et al.,* (2019).

Table 5: Marketing constraints faced by the ragi growers in the study area (n=90).

| Sr. No.	Particulars	High	Moderate	Low	No Problem	PCI	Rank
1.	Fluctuation in market price	27	21	21	21	144	1
2.	High margin of middlemen	21	28	19	22	138	2
3.	Delay in cash payment from the traders	21	20	28	21	131	3
4.	Inadequate storage facilities	25	17	21	27	130	4
5.	High cost of transportation	20	28	12	30	128	5
6.	Less awareness of online trading	23	19	19	29	126	6
7.	Malpractice in market yard	15	22	23	30	112	7
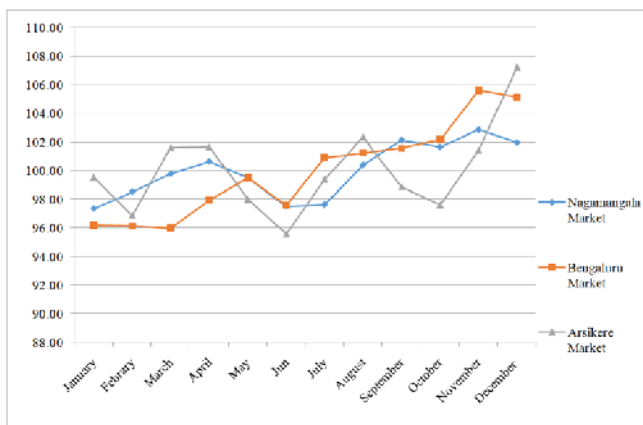
Fig. 2. Seasonal indices of ragi prices in different markets.

CONCLUSION

The area and production of ragi have made rapid strides in the country. The result revealed that annual increase in price of ragi every year was observed to be high in case of Bengaluru market with ₹ 202.52 per quintal followed by Nagamangala market with ₹ 144.27 per quintal and Arsikere market with ₹ 131.36 per quintal. The reason for the different behavior in arrivals in the selected markets is on account of huge transaction in the selected markets. The prices of ragi showed increasing trend in all the selected markets which may be due to increase in awareness about its nutritional value, which in turn increases the demand for ragi coupled with the inflationary trend in the prices of ragi compared to other millets. The study concludes that the involvement of market stakeholders is high in the major markets due to high demand for ragi from the point of processors. Fluctuation in market price followed by high margin of middlemen and inadequate storage was

identified as the major constraints in the study area. Due to high fluctuation in the arrivals and prices of ragi in selected markets during certain period, the government should intervene to equalize the ragi prices at least in the districts which in turn reduce the price variation to larger extent. The traders must be encouraged to quote prices strictly according to scientific grading as and when such a grading system made available to them.

REFERENCES

Anonymous (2021). India stat. Agricultural Production.

Darekar, A. S., Pokharkar, V. G., Nimbalkar, C. G., & Datarkar, S. B. (2015). An economic analysis of behaviour of market arrivals and prices of onion in selected markets of Western Maharashtra. *International Journal of Tropical Agriculture*, *33*(2 (Part II)): 1087-1093.

Gireesh, S., Kumbhare, N. V., Nain, M. S., Kumar, P., & Gurung, B. (2019). Yield gap and constraints in production of major pulses in Madhya Pradesh and Maharashtra. *Indian Journal of Agricultural Research*, *53*(1): 104-107.

Kumar, Y. M., Subhita, K., Sanjiv, K., & Subodh, A. (2017). Pattern of Market Arrivals and Prices of Gram in Rajasthan. *International Journal of Agriculture Sciences*, *9*(32): 4471-4475.

Kumari, M. V., Masih, A. K., Singh, N., & Shukla, K., (2019). Constraints faced by farmers in production and marketing of selected pulses in Mahabubnagar district of Telangana state. *International Journal of Agricultural Sciences*, *11*(10): 8536-8540.

Makhare, P. K., & Tarpara, V. D. (2019). Price movement of cotton across major markets of Saurashtra region of Gujarat state. *Journal of Cotton Research and Development*, *33*(1): 149-156.

Sahoo, S. P., & Singh, R. (2017). Trend and seasonality in prices and arrivals of Bengal gram. *Indian Journal of Economics and Development*, *5*(7): 1-5.

Shruthi, M., & Krishnamurthy, K. N. (2013). Statistical study of trends in arrivals and prices of maize in selected markets of Karnataka. *Mysore Journal of Agricultural Sciences, 47*(4): 791-796.

Shobana, S., Krishnaswamy, K., Sudha, V., Malleshi, N. G., Anjana, R. M., Palaniappan, L., & Mohan, V. (2013). Finger millet (Ragi, *Eleusine coracana* L.): a review of its nutritional properties, processing and plausible health benefits. *Advances in Food and Nutrition Research, 69*: 1-39.

Sonvanee, O. P., & Koshta, A. K. (2019). A study on arrivals and price behavior & forecasting of chickpea in Krishi Upaj Mandis of Chhattisgarh plains. *Plant Archives*, *19*(2): 3231-3237.

Sonvanee, O. P., & Koshta, A. K. (2019). A study on arrivals and price behavior & forecasting of lathyrus in Krishi Upaj Mandis of Chhattisgarh plains. *Journal of Pharmacognosy and Phytochemistry*, *8*(3): 4319-4324.

How to cite this article: Vennila M. and Murthy, C. (2021). Behaviour of Market Arrivals and Prices of Ragi in Karnataka. *Biological Forum – An International Journal*, *13*(3): 567-572.